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The STANDARD OF QUALITY
SINCE 1892
MADE IN U.S.A.
Nº S 2552-2ML
BOORUM & PEASE CO. BROOKLYN, N.Y.

Ed.
McKenzie pass, Oregon
Mt. Jefferson (?)
13 Sept 1947

828M

SUMMIT
McKENZIE
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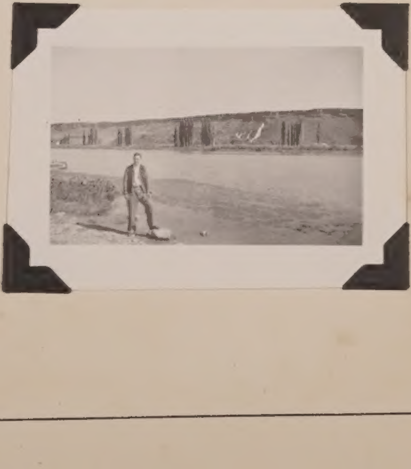

Tom
13 Sept 1947

829M

Grand Teton
NATIONAL PARK
and
Jackson Hole
NATIONAL MONUMENT
WYOMING

NO ADMITTANCE

Ed
Jackson Lake
Teton Range
Grand Teton Nat. Park
Wyoming
15 Sept 1947

AND TETON – [illegible] – WYO

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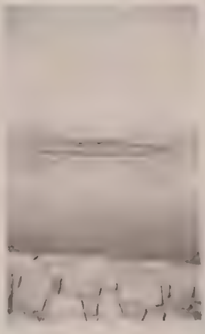

THREE SISTERS SPRINGS

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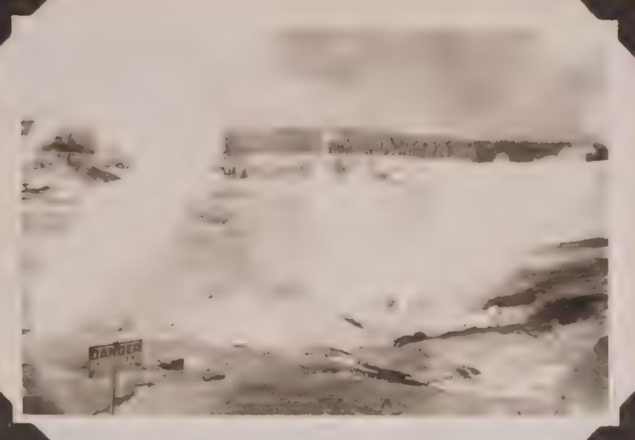
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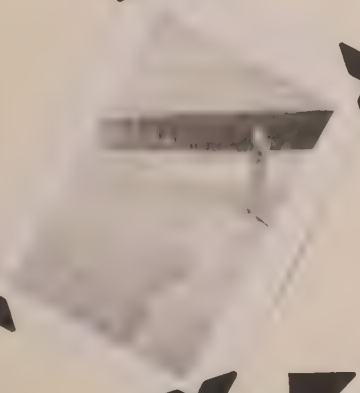

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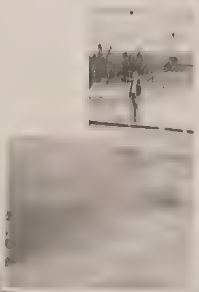

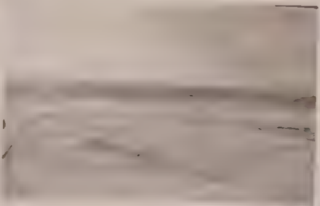

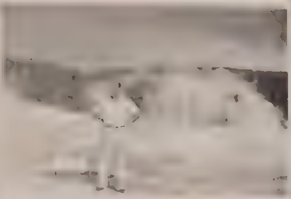

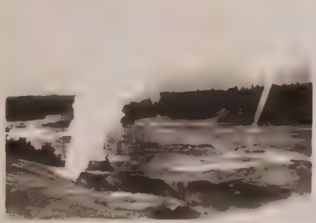

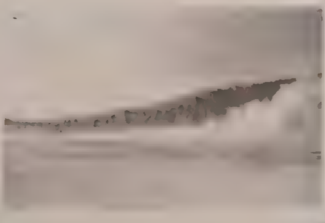

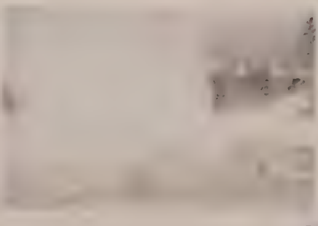

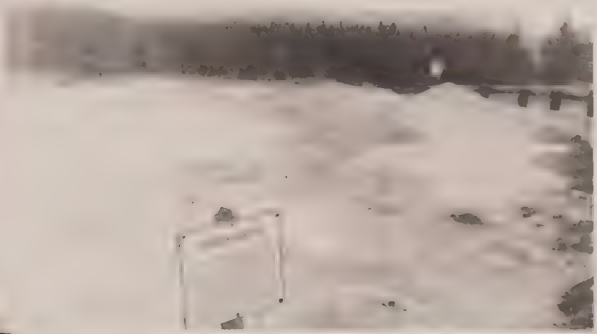

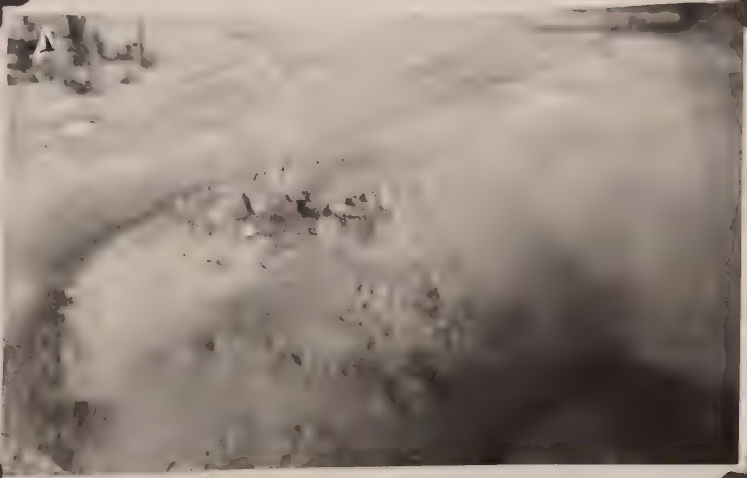

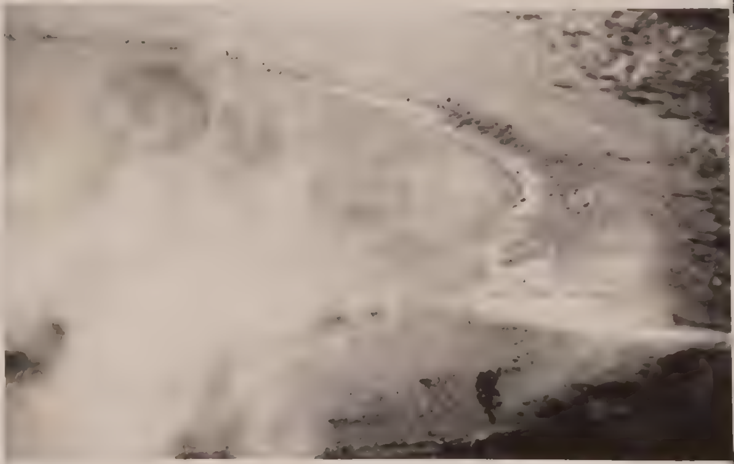

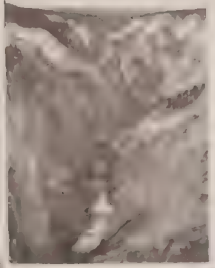
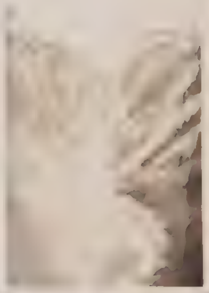

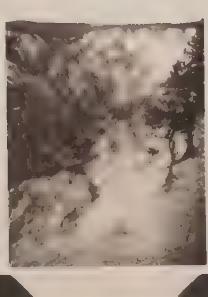
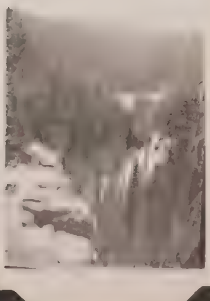

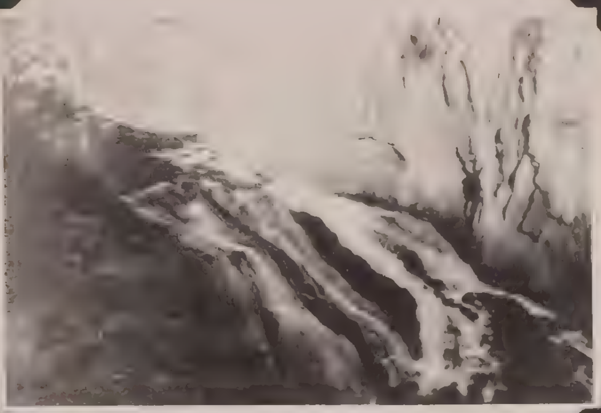

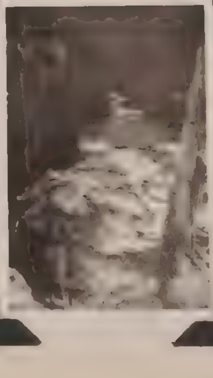

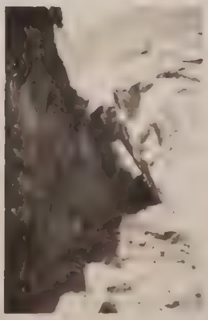

ROARING
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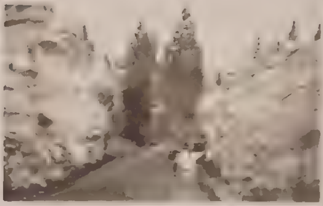
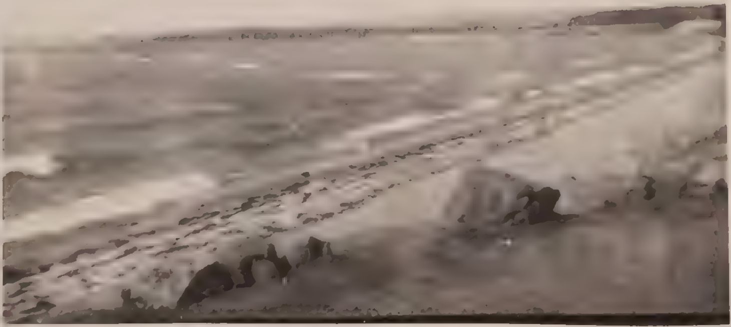
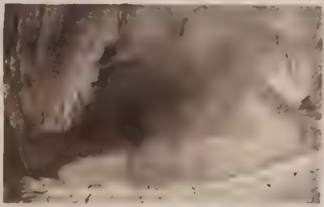


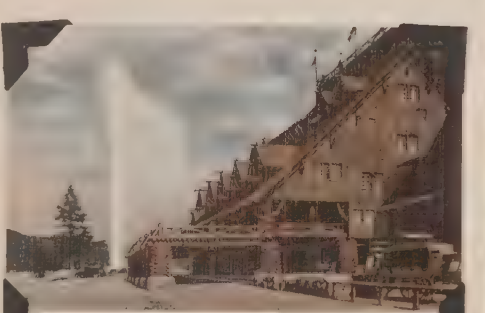




YELLOWSTONE CANYON FROM GRAND VIEW, YELLOWSTONE PARK

HA

23443 KEPLER CASCADE, FIREHOLE RIVER.
YELLOWSTONE PARK © HAY



478 © OLD FAITHFUL INN AND GEYSER, YELLOWSTONE PARK

56 LOWER FALLS, YELLOWSTONE CANY
308 FEET. YELLOWSTONE PARK © HA

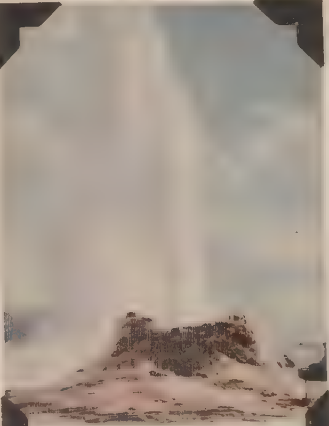
0096 SAPPHIRE POOL AND BISCUIT BASIN, YELLOWSTONE PAR

14013 © DAISY GEYSER, 70 FT.,
YELLOWSTONE PARK

2637 DRAGONS MOUTH SPRING, YELLOWSTONE PARK
© HAYNES

34190 © GROTTO GEYSER, YELLOWSTONE PARK

10160 OLD FAITHFUL GEYSER AT SUNRIS
YELLOWSTONE PARK



16062 CASTLE GEYSER, 75 FT.,
YELLOWSTONE PARK © HAYNES IN

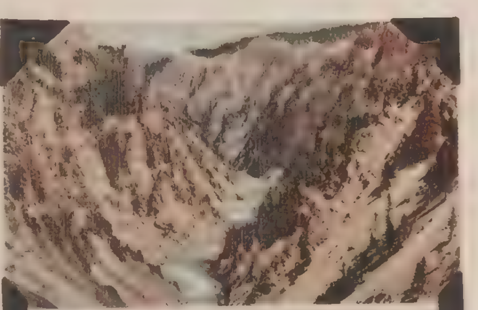
10154 GRAND GEYSER, 200 FT.,
YELLOWSTONE PARK © HAYNES INC

16049 MORNING GLORY POOL, YELLOWSTONE PARK
© HAYNES INC

12546 © EMERALD POOL, YELLOWSTONE PARK

10101 CRESTED POOL AND CASTLE GEYSER CONE
YELLOWSTONE PARK
© HAYNES INC

28 GRAND CANYON FROM ARTIST POINT, YELLOWSTONE PARK
© HAYN



28335 © YELLOWSTONE CANYON FROM BRINK OF FALL,
YELLOWSTONE PARK

10120 YELLOWSTONE CANYON AND POINT LOOKOUT,
YELLOWSTONE PARK

121 UPPER FALL OF THE YELLOWSTONE, 109 F
YELLOWSTONE PARK

10124 © LOWER FALL FROM BELOW, 308 FT
YELLOWSTONE PARK

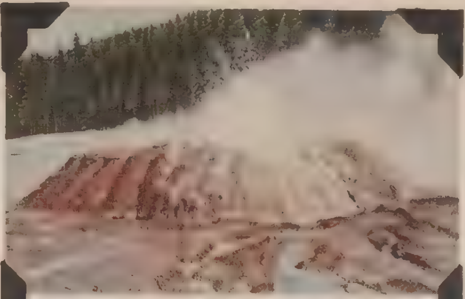
16181— BUFFALO STAMPEDE, YELLOWSTONE NATIONAL PARK
COPYRIGHT BY HAYNES INC., YELLOWSTONE PARK,

388 OVERHANGING CLIFF NEAR TOWER FA
YELLOWSTONE PARK © HAYN

10138—A PARK DEER, YELLOWSTONE NATIONAL PARK
HAYNES INC., YELLOWSTONE PARK, WYO

24272—MULE DEER FAWN, YELLOWSTONE PAR
PYRIGHT BY HAYNES INC., YELLOWSTONE PARK, W

13053—A PARK BEAR, YELLOWSTONE NATIONAL PARK
HAYNES INC., YELLOWSTONE PARK, WY



16337 SPONGE GEYSER, YELLOWSTONE PARK

© HAYNES INC

040 OLD FAITHFUL GEYSER, 150 FT.,
YELLOWSTONE PARK © HAYNES

34200 GIANT GEYSER CONE, YELLOWSTONE PARK

© HAYNES IN

17384 © TOWER FALL, HEIGHT 132 FEET
YELLOWSTONE PARK

1 CHITTENDEN BRIDGE AND MT. WASHBURN, YELLOWSTONE PARK

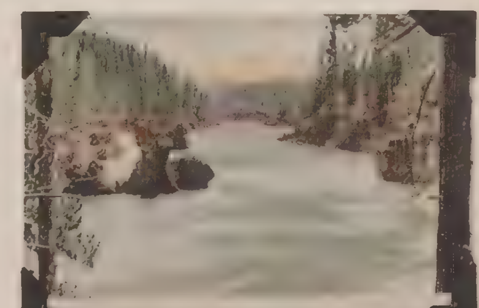
© HAY

23480 © NEEDLE IN GRAND CANYON
EAR TOWER FALL, YELLOWSTONE PA

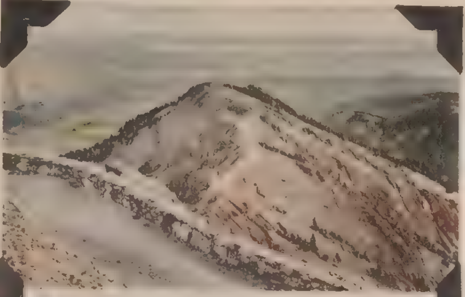
13021 © NEEDLES IN YELLOWSTONE CANYO
EAR TOWER FALL, YELLOWSTONE PA

10097 PUNCH BOWL SPRING, YELLOWSTONE PARK
© HAYNES IN

10100 OBLONG GEYSER CRATER, YELLOWSTONE PARK
© HAYNES



247 © RAPIDS ABOVE THE UPPER FALL, YELLOWSTONE PA



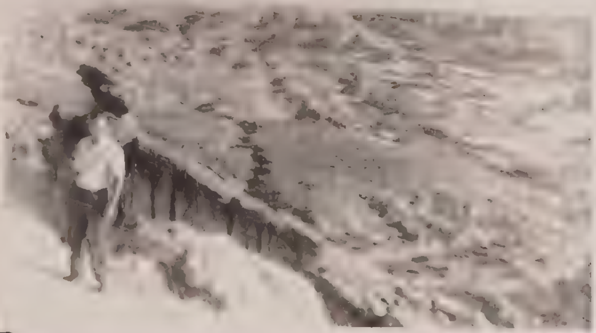
6276 FROM THE SUMMIT OF MT. WASHBURN, ELEV. 10,317 FT.,
YELLOWSTONE PARK © HAYN

5 RIVERSIDE GEYSER, YELLOWSTONE
© HAY

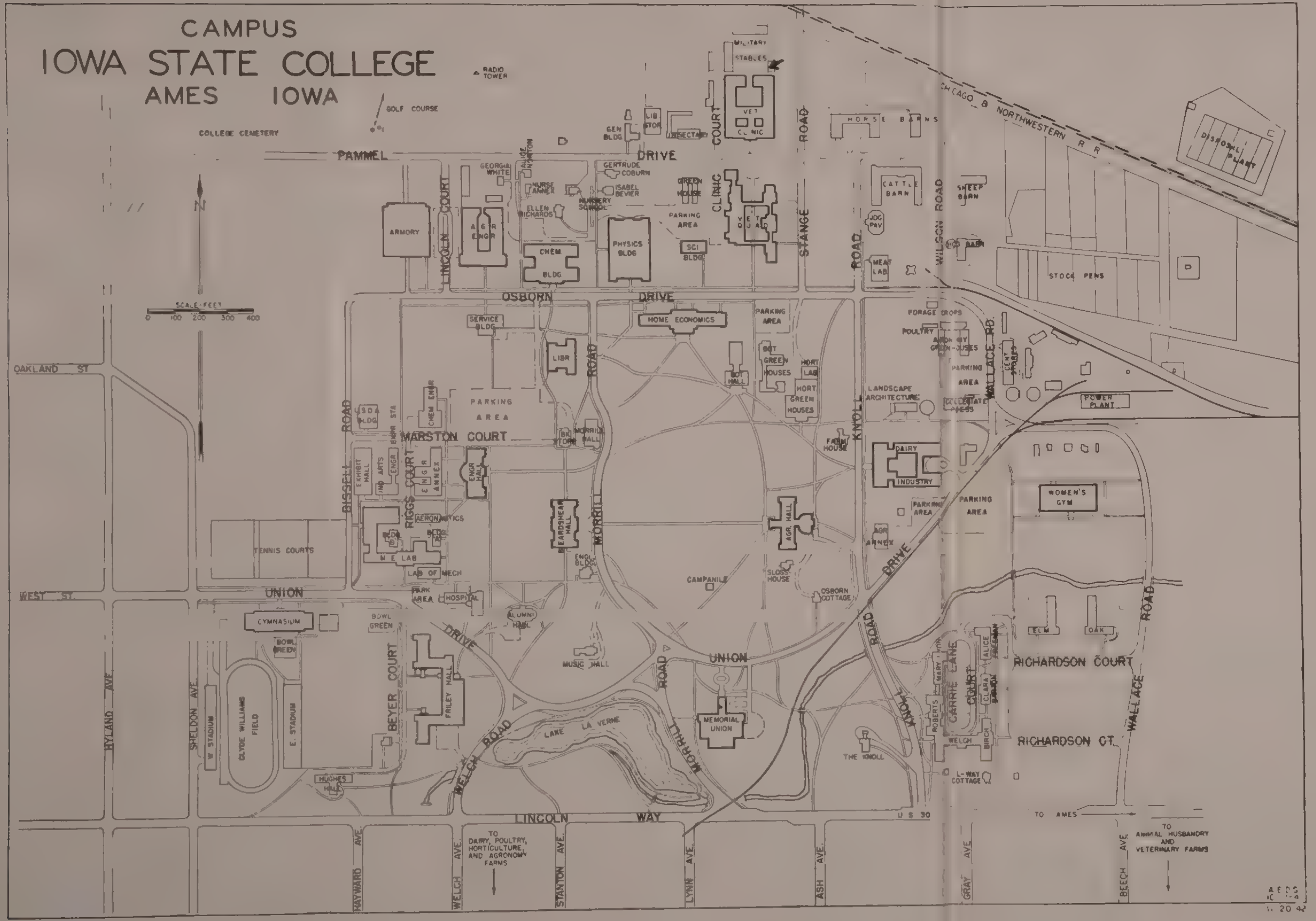
35349P GRIZZLY BEARS, OTTER CREEK FEEDING GROUNDS,
YELLOWSTONE PARK HAYNE

063 GIANT GEYSER, HEIGHT 180 FEET,
YELLOWSTONE PARK HAYN

10103 UPPER GEYSER BASIN, YELLOWSTONE PARK



IOWA STATE COLLEGE CAMPUS



CAMPUS
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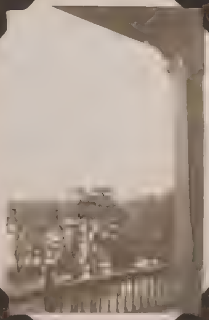

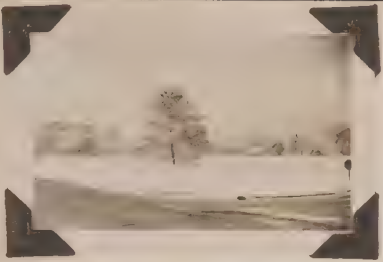

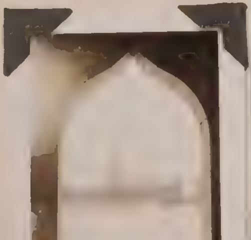

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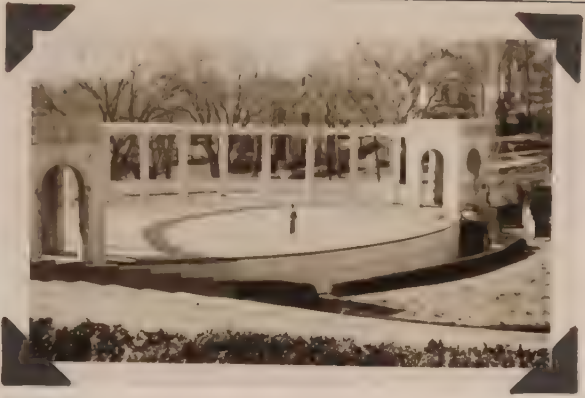

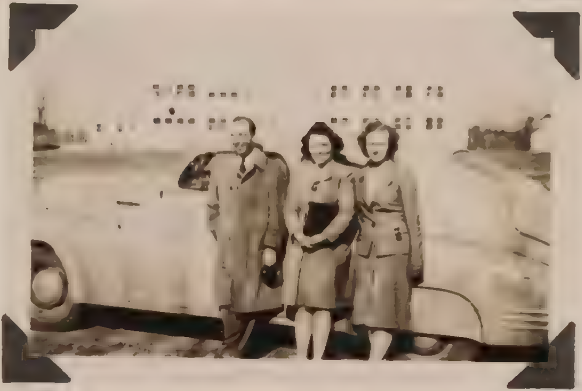

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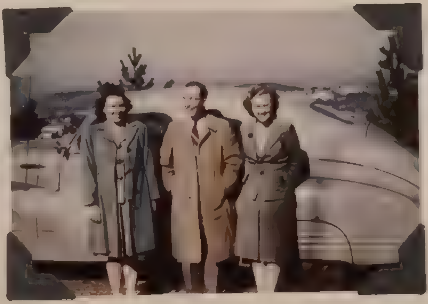

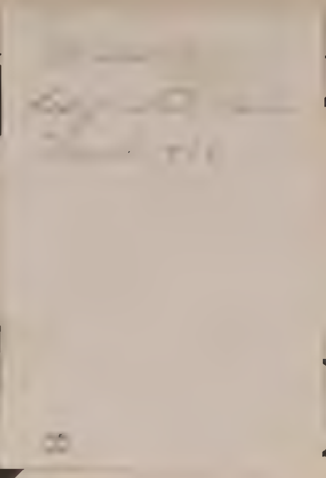

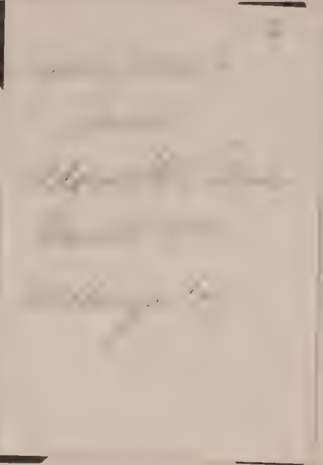

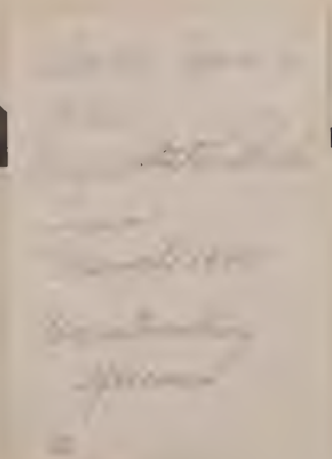

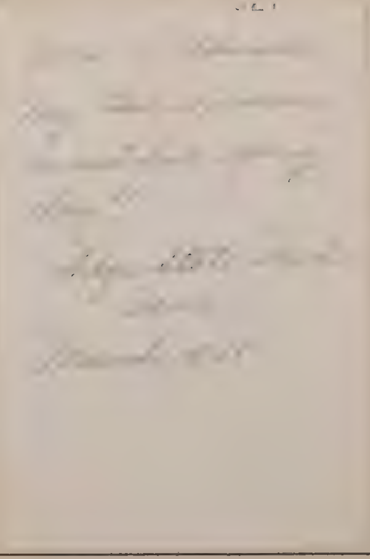

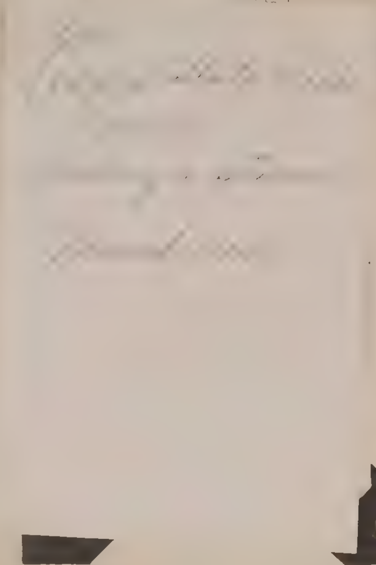

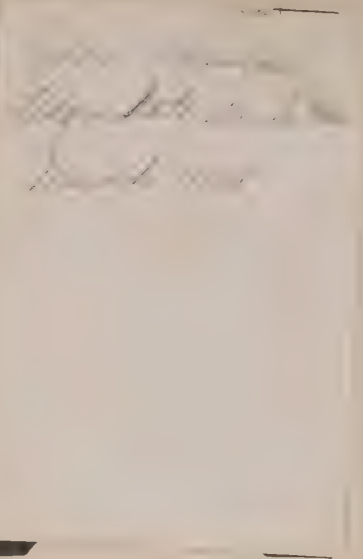

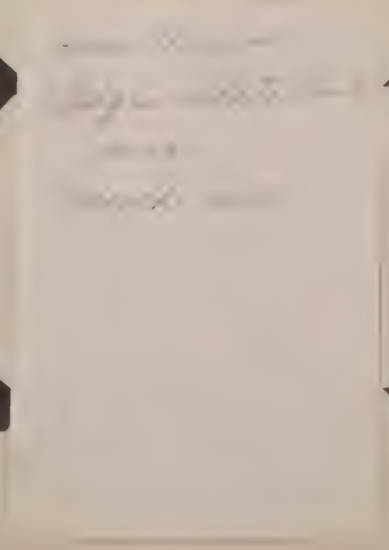

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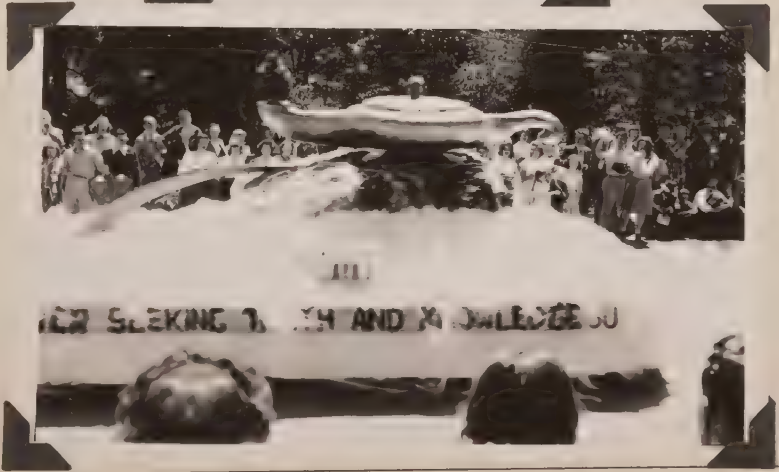
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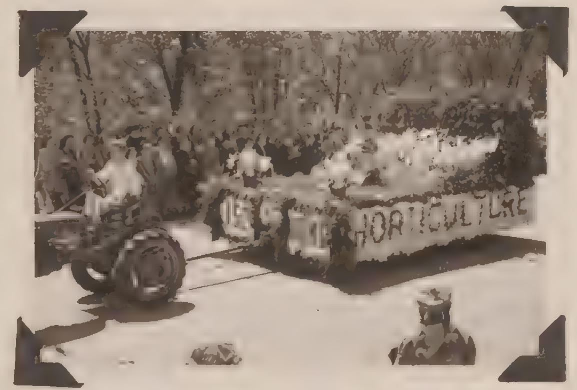
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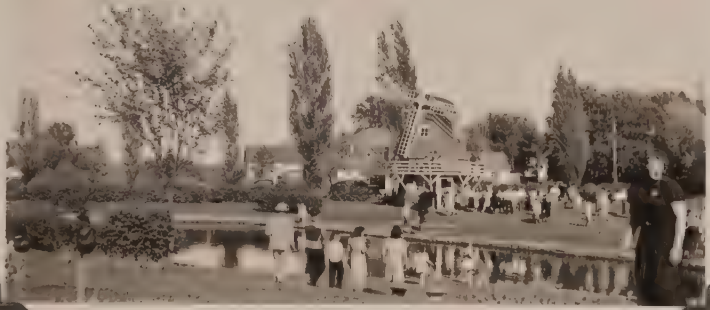

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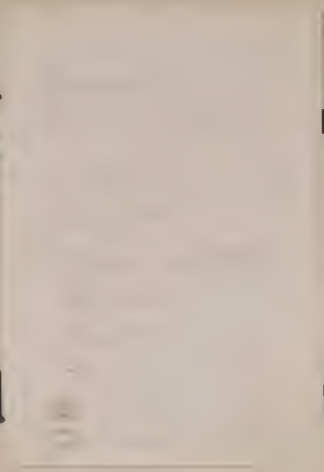

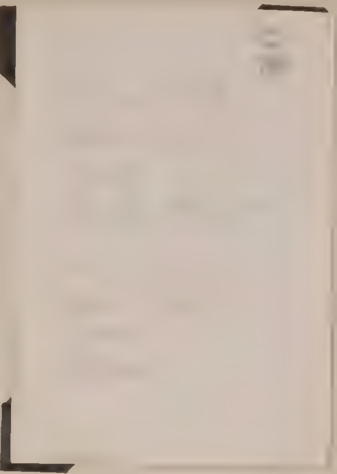

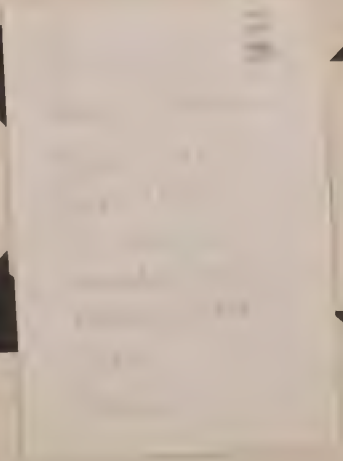

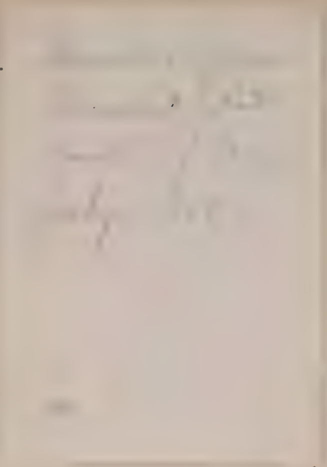

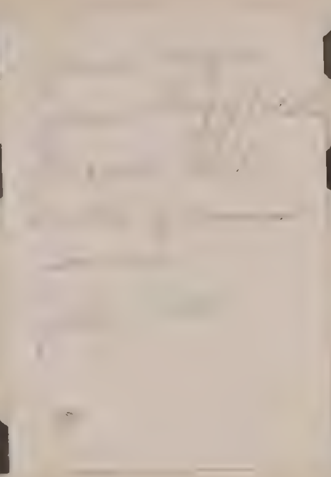

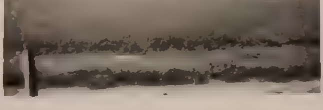

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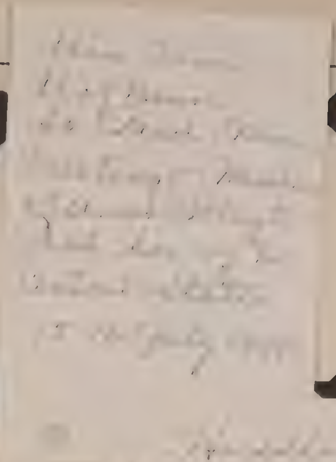
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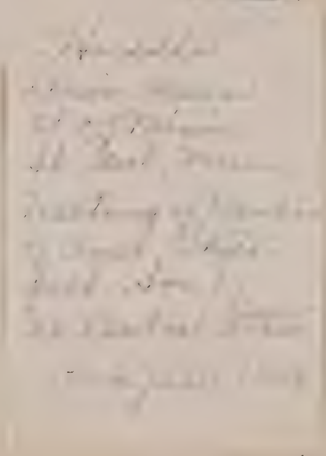
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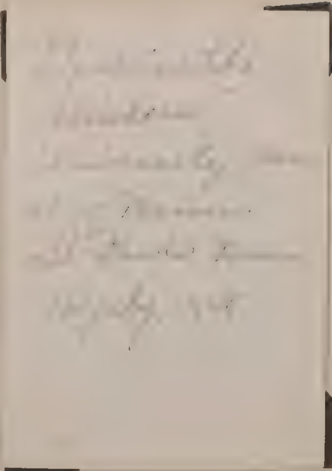
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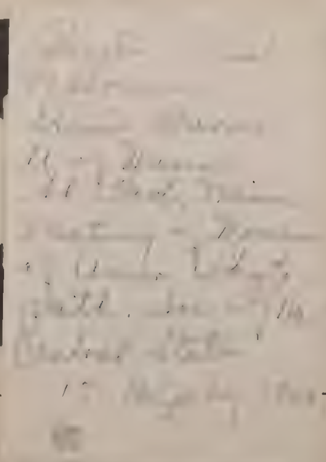
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See the World-famous

COLUMBIA RIVER GORGE

and Mammoth

BONNEVILLE DAM

UNION PACIFIC STAGES THE OVERLAND ROUTE

UNION PACIFIC STAGES

Scenery that amazes . . . beauty that enchants!

Snow-capped Mt. Hood, 11,225 feet

STEP aboard a smoothriding Union Pacific bus for the scenic trip of a lifetime—through the world-famous Columbia River Gorge! Sheer beauty combines with spectacular natural wonders to provide a sightseeing tour you'll never forget.

LEAVING PORTLAND, you head east across the new Burnside drawbridge, thence on Sandy Boulevard to the city limits at 82nd Avenue.

JANTZEN KNITTING MILLS. Main plant and office; original home site of famous Jantzen swimming suits; average production of 8,000 suits daily. Approximately 800 employees during the fall and winter months.

GROTTO. Sanctuary of Our Sorrowful Mother, conducted by the Servite Fathers who are an individual order of the Catholic Church.

7.5 Miles—INVERNESS GOLF COURSE. Thirty-six hole public course.

11.2 Miles—MT. HOOD. Elevation 11 225 feet, visible to the southeast.

11.2 Miles—MT. ST. HELENS. Elevation 9,671 feet, visible to the north on the Washington side of the Columbia River.

15.5 Miles—TROUTDALE. Noted for lettuce, celery, and cauliflower. Various international prizes have been won for their fine quality.

16 Miles—SANDY RIVER. In the year 1805 this river was named "Quicksand" river by the Lewis and Clark Expedition, changed to "Sandy" between the years 1845 to 1850. This river is fed from the glaciers of Mt. Hood and is noted for the smelt run each spring.

18.5 Miles—SPRINGDALE. Weatherly Farms located here. One of the largest poultry farms in the Northwest.

20.5 Miles—CORBETT. Originally 600 acres of heavy timber stood where the present village is now located. Large tulip and gladiola farms near highway. The bulbs from these farms are sent to all parts of the country.

22.4 Miles — "ROAD BUILDER" MONUMENT. A fifty-ton granite monument erected in honor of Samuel Hill, through whose efforts the Columbia River Highway was built.

22.5 Miles — FIRST VIEW OF THE COLUMBIA RIVER AND GORGE.

22.6 Miles — THE SUMMIT — 925 feet above the Columbia River and about 965 feet above sea level. Highest point on the Columbia River Highway. "Rooster Rock," a 285-foot basalt pinnacle, can be seen on the Oregon side of the river.

23.6 Miles — CROWN POINT AND VISTA HOUSE—725 feet above the river and approximately 1½ miles across to land on the Washington side. Crown Point, formerly called "Thor's Crown," a basalt cliff. Vista House is a pioneer memorial in stone and marble built in 1917. A portion of the retaining wall used around the base and adjacent to the highway is Italian dry masonry, no mortar being used. A wonderful view of the Columbia River and Gorge may be had from this point.

THE FIGURE EIGHT. Leaving Crown Point, the highway descends about 500 feet in 2½ miles in a series of curves resembling a figure eight. Notice unusual amount of wild ferns along the highway.

26.1 Miles—LATOURELL BRIDGE AND FALLS. As you approach the center of the bridge, look to the south for Latourell Falls. The falls originate about five miles south in a series of springs to form Latourell Creek, which tumbles over a wall of columnar basalt to drop 249 feet. Named for pioneer Joseph Latourell. Talbot State Park, 125 acres, adjacent to the Falls was donated to the State of Oregon by Guy W. Talbot in 1929.

27.3 Miles—SHEPPERD'S DELL. An 11-acre park donated to the State by George Shepperd, as a memorial to his wife who enjoyed spending hours by the falls.

28.4 Miles—BRIDAL VEIL FALLS. 80 feet. As you approach center of bridge notice lumber flume which conveys lumber cut at the Palmer logging camp, located five miles south, to the finishing mill directly below the bridge. After leaving bridge you can see the falls to the west.

28.5 Miles—WASHINGTON SIDE—SHED COVERING EVERGREEN HIGHWAY. Engineers in building Evergreen Highway erroneously analyzed rock formation. Dynamite blew down instead of up, resulting in a permanent rock slide.

31.7 Miles—WAH-KEE-NAH FALLS. 242 feet. Flows from mountain spring 1-1/10 miles above point where it breaks over to cascade to highway. The name "Wah-kee-nah" is a Yakima Indian name meaning "Most Beautiful." Benson CCC Camp and public picnic grounds north of highway.

32.2 Miles—MULTNOMAH FALLS. 620 feet. Flows from spring approximately four miles before breaking over cliff to form the second highest falls in the United States (the highest being Yosemite Falls). Multnomah Falls is named for Chief Multnomah, who supposedly bound warring tribes in peace pact. The word also means "Down the River." Larch Mountain hiking trail begins here.

34.6 Miles—ONEONTA GORGE AND TUNNEL. Indian name meaning "Place of Peace." Oneonta Falls about 1,000 feet up the gorge which is narrow enough in places to touch both sides with arms outstretched. Automatic traffic signal through tunnel.

34.9 Miles—HORSETAIL FALLS. Flows from mountain spring approximately four miles from point where it tumbles 208 feet over columnar basalt cliff. St. Peter's Dome and Cathedral Point 2,000 feet high to the southeast.

37.8 Miles—BEACON ROCK. 850 feet. On the Washington side. Probably a basalt plug forced upward through a volcanic cone. Base covers 10½ acres. In the year 1805 Lewis and Clark named it Beacon Rock. At the present time the United Air Lines maintain a beacon on the top.

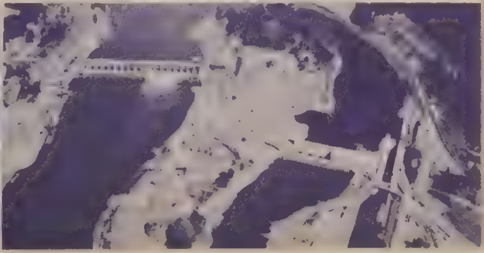
38.5 Miles—WARRENDALE. Named for Frank M. Warren, first salmon packer here (the cannery is not being operated at present). Note salmon wheels on the Washington side of the river for the next few miles. These wheels are now outlawed.

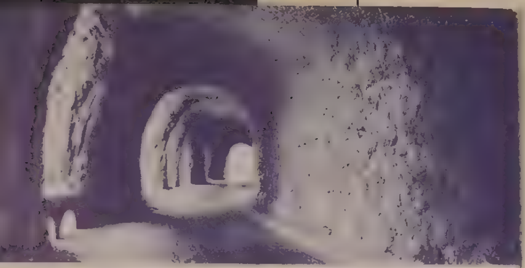
39.1 Miles—ELOWAH FALLS. 289 feet. Seen to the extreme south. Notice large petrified fir tree stump at the east end of bridge.

Scenic Oneonta Gorge

Vista House on Crown Point

Aerial View of Bonneville Dam





Mitchell Point Tunnel

41.9 Miles—BONNEVILLE. Named for Captain L. E. Bonneville of the U. S. Army, who explored this region in 1832 and 1835. Site of the new Federal Power and Navigation Project, the Bonneville Dam, built by the United States War Department. Cost of the dam, power plant, fishways, and appurtenant structures, will be about $70 000,000. Dam proper is 1,250 feet long, extending from Washington side to Bradford Island; gravity overflow spillway type; 180 feet wide at base surmounted by 18 steel gates 50x50 feet each between concrete supports ten feet thick. Gantry traveling crane raises and lowers gates to control head of water. Levee on Bradford Island is about 1,200 feet long to power house which is 207x610 feet and will accommodate ultimate installation of ten to twelve units of 43,000 kilowatts each. Navigation lock on Oregon side has a single lift of 62 feet, which is the greatest in the world; approach through a 2,000-foot canal; will pass a boat through in approximately 15 minutes. Dam forms a channel 1,200 feet wide and 30 feet deep, 42 miles long to The Dalles, Ore. New Civic Auditorium and Administrative Building together with 20 permanent residences form what is known as Civic Center. Homes are for the permanent employees stationed at Bonneville upon completion of the Dam.

BONNEVILLE STATE FISH HATCHERY. Largest of the 18 in the State of Oregon; hatches 14,000,000 Royal Chinook, Sockeye and other salmon annually.

43.2 Miles—EAGLE CREEK FOREST CAMP. Public picnic and camp grounds.

45.7 Miles—BRIDGE OF THE GODS. Toll bridge. Here, according to Indian legends and supported in theory by geologists, a mighty stone bridge once spanned the Columbia River. Notice the rock formations on the Washington side; they appear to have supported additional rocks at one time.

45.8 Miles—CASCADE LOCKS. Government Canal Locks built in the year 1884 made it possible for river boats to go around the Cascade Rapids. (These rapids are entirely submerged due to the completion of the Bonneville Dam.)

49 Miles—COLUMBIA GORGE RANGER STATION. U. S. Forest Service for patrol of the Columbia River Gorge district of the Mt. Hood National Forest. West Coast Power Company operates a 500 horsepower plant at this point.

53.4 Miles—WYETH. CCC Camp Cascade. Wind Mountain on the Washington side. Approximately five miles further east if you look back, you will see an Indian head clearly outlined on the south side of this mountain.

54.8 Miles—SHELL ROCK MOUNTAIN. Geologically belongs with Wind Mountain across the river. Note retaining wall on south side of highway. Each year it is necessary to add height to hold back rocks which are continually falling, due to mountain reportedly moving each year.

57.8 Miles—STARVATION CREEK. Starvation Falls, named for suffering of people snowbound during the winter of 1884-1885. Notice Broughton Lumber Company flume on Washington side which is nine miles long and one of the longest in the Northwest.

62.2 Miles—MITCHELL POINT TUNNEL. Highway passes through a gallery 400 feet long with five windows hewn out of basalt rock.

67 Miles—HOOD RIVER. Originally named Dog River, later changed to Hood River for Admiral Hood of the British Navy. Inland seaport and center for apple, pear, and cherry orchards. On site of Indian village Waucoma (Place of the Cottonwoods). Early terraced burial ground one mile east of the hills. Two miles east on the Columbia River is Memaloose Island, which is an Indian name given to any Indian burial ground. Hood River has a State Fish Hatchery located 11 miles southeast of south fork of Hood River. Hood River is gateway to Mt. Hood Loop Highway which includes Cloud Cap Inn, Government Camp and Timberline Lodge. Oregon State flower, the Oregon Grape, was christened by George H. Himes at this point.

MT. ADAMS. 12,307 feet. To the north of Washington side.

SEE YOUR LOCAL BUS AGENT FOR COMPLETE INFORMATION ON TRIP TO OTHER POINTS IN THE COLUMBIA RIVER GORGE.

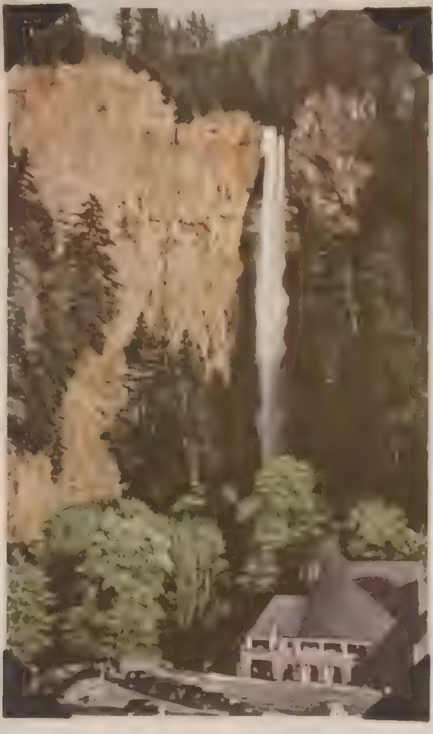
This folder describes points between Portland and Hood River, but the Columbia River Highway extends to Umatilla, Ore., 193 miles from Portland, in which distance there are many scenic and historic points of interest.

Lennah
Crown Point, Oregon
4 Sept. 1948

Lennah
Multnomah Falls
4 Sept. 1948

ighway - Oregon
from Crown Point
4 Sept. 1948

Lennah
Multnomah Falls
4 Sept. 1948



[illegible]

[illegible]N and WASHINGTON

CORPS OF ENGINEERS, U. S. ARMY

PORTLAND DISTRICT

1949

THE PROJECT

The Columbia River has its source in the Rocky Mountains in the Dominion of Canada and, after flowing some 460 miles, enters the United States in the northeastern corner of the State of Washington. It crosses the state in a southerly direction to the mouth of the Snake River, near Pasco, then turns westerly to form the boundary of Oregon and Washington. The river has a length of 1,210 miles and drainage area of 259,000 square miles.

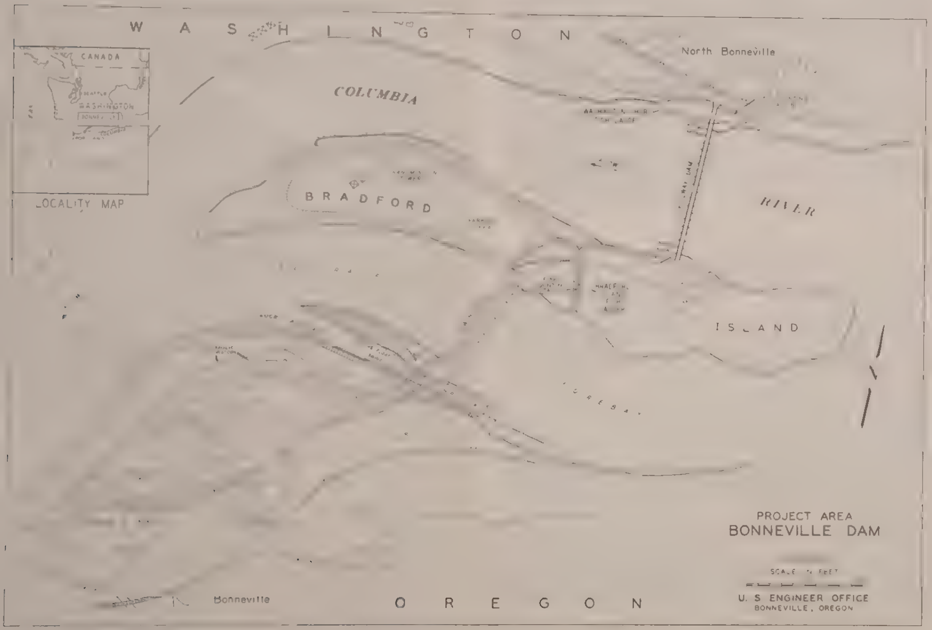
At the site of Bonneville Dam, the Columbia River flows westerly in two channels separated by Bradford Island. The spillway dam is located in the north or main channel, and the powerhouse and navigation lock are located in the south channel. Fishladders are located at each end of the spillway dam and across the downstream face of the powerhouse. An administration building, auditorium, warehouse, and permanent residences are a part of the Government reservation. The Bonneville Hydraulic Laboratory is also located on the reservation.

The project is open daily to the public for inspection during daylight hours. Parking areas are provided for visitors near the navigation lock, fishways, and spillway dam.

Improvement of the Columbia River at Bonneville, Oregon was undertaken on September 30, 1933 under the provisions of the National Recovery Act; formal authorization by Congress was made under the River and Harbor Act approved August 30, 1935. The project is located on the Columbia River about 40 miles east of Portland, Oregon, and consists of a spillway dam, powerhouse, navigation lock, and fishways. The total construction cost of the project amounts to approximately $81,840,000 of which 48% represents power facilities, 35% spillway dam, 7% navigation lock, and 9% fishways.

The entire project was constructed and is being maintained and operated under the direction of the Secretary of the Army and the supervision of the Chief of Engineers, Department of the Army. Immediate supervision of the project is under the direction of the District Engineer, Corps of Engineers, 628 Pittock Block, Portland 5, Oregon. A Corps of Engineers Sub-Office is located at the Dam.

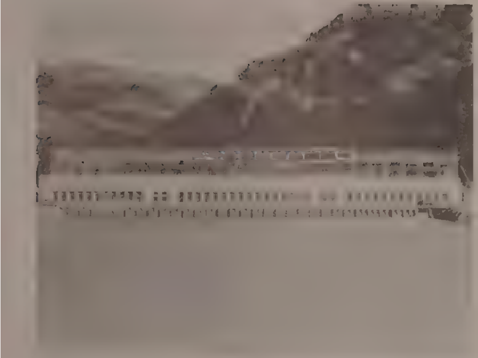
The transmission and sale of electric energy generated at Bonneville is under the direction of the Secretary of Interior and the supervision of the Bonneville Power Administration.



PROJECT AREA
BONNEVILLE DAM

U. S ENGINEER OFFICE
BONNEVILLE, OREGON

POWERHOUSE



Downstream View Of Powerhouse

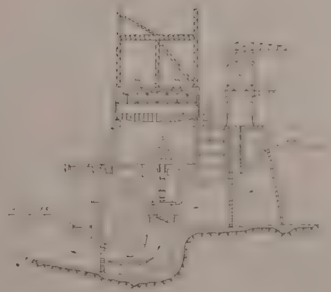
Generator Room

The powerhouse, located between Bradford Island and the Oregon shore, is founded on hard andesite rock which was excavated to a maximum depth of 93 ft. below sea level. Two rock and earth fill cofferdams, one upstream and the other downstream, protected the area from normal river flows during construction of the structure. The [illegible] provided for the completion of the substructure to accomodate six generating units and a station service unit. With the advent of World War II electric energy demand for war industries rapidly increased, so excavation and construction was immediately put under way to provide for the additional four generating units ultimately planned. The final installation was completed in record time by December 1943, making a total of ten main generating units and a station service unit

Each generating unit consists of a hydraulic turbine driven generator with auxiliary controlling mechanism. The turbines are of the Kaplan adjustable-blade propeller type. Water is admitted to the turbines by means of 20 wicket gates for each unit; these gates are similar in operation to vertical Venetian blinds. As electric loads increase on the units, the automatic governor control opens the wicket gates thereby permitting more water to pass through the turbine. Simultaneously with the opening of the wicket gates the adjustable propeller blades are moved to a steeper angle, thereby holding the turbine to its maximum efficiency. In a reverse manner the governor operates for decreasing loads.

The main generators are located on the ground-level floor of the powerhouse. They are of the vertical shaft type, and are directly connected to the turbine shaft Below the generator rotor is a single thrust bearing that carries the entire weight of the rotating parts of the generator and turbine, and the hydraulic thrust developed on the turbine propeller blades. The generating units may be controlled individually from adjacent control panels, but over-all control of the station is from the master control room. The operator on duty coordinates all activities within the powerhouse and connections with the transmission system.

On the +90 deck of the upstream face of the powerhouse are located the transformers that step up the generated voltage of 13,800 to 115,000 and 230,000 volts for transmission. The high tension switching equipment on the roof of the powerhouse is where the power generated is delivered to the transmission lines of the Bonneville Power Administration.



Cross Section Of Powerhouse

NAVIGATION LOCK

S. S. "Charles L. Wheeler, Jr.", Leaving Shiplock On Way Downstream July 1938

The Columbia River has a project depth of 35 ft. from its mouth to the mouth of the Willamette River near Portland, and 30 ft. to the City of Vancouver, Washington. The work of dredging a 27-foot channel between Vancouver and Bonneville has been completed with the exception of a few places where sufficient depth is maintained for barge traffic only. Depth of the pool above Bonneville Dam to The Dalles, Oregon is 30 ft. or over.

Excavation for the navigation lock at Bonneville Dam was made in andesite rock, and the exposed wall surfaces were faced with concrete anchored to the rock. The additional height required was secured by concrete construction of both gravity and counterfort type walls.

In "locking through" a ship going upstream, the upstream gates are first closed, then the lock chamber is emptied to the level of the river downstream by means of the two emptying valves located in the west end of the lock walls. The downstream gates are then opened and the ship signaled to enter the lock and tie up to the floating mooring bits recessed in the lock walls. The downstream gates are closed, and the chamber filled to the upper pool level by means of the filling valves located in the east end of the lock walls. Upon opening the upstream gates, the ship may pass out of the lock into the Bonneville pool and proceed upstream. Downstream passage of shipping is effected in a reverse manner. All machinery is electrically driven and may be controlled from stations located at either end of the north side of the lock.

During 1941 - 1948, the average annual shipping passing through the lock was about 879,800 tons.

SPILLWAY DAM

The [illegible] olumbia River at Bonneville is 200,000 cubic feet per secon [illegible] low is about 40,000 c.f.s., and the average annual spring flood [illegible] ately 585,000 c.f.s. The low flows, generally lasting only a few [illegible] winter, and are often accompanied by floating [illegible] Floo [illegible] ult of melting snow near the headwaters of the river [illegible] h their peak in June. The maximum flood of record, 1,170 [illegible] 4, and is locally known as the "1894 Flood" The [illegible] of Bonneville Dam occurred in June 1948 with [illegible]

The [illegible] he site of Bonneville Dam, a distance of 140 miles from the ocea[illegible]

Th [illegible] of the spillway dam is to maintain the desired level in the uppe [illegible] l elevation of +72.0 ft m.s.l. is required to provide navigab [illegible] Bonneville to the Celilo Canal near The Dalle[illegible] Or [illegible] ry "head" (difference in elevation between the upper [illegible] water) on the powerhouse turbines. During periods of floo [illegible] ft. m.s.l. to maintain a minimum of 50 ft head [illegible] ting purposes. The 18 spillway gates are used to adjust the [illegible] and to pass river flow in excess of that used by th [illegible] rate power

P[illegible] e destructive action of the high velocity water issuing from be [illegible] cured by a double row of baffles and a wide concrete a [illegible] wnstream toe of the dam. The piers have been designed to wit [illegible] pressure resulting from alternate open and closed gate [illegible] riveted structural steel, with roller bear ing [illegible] er of the two gate slots constructed in the pi [illegible] ith special lifting and latching mechanisms [illegible] hat [illegible] the whole gate may be moved at one time. They [illegible] rai [illegible] ther [illegible] two 350-ton gantry cranes atop the dam.

Bradford Island Fishway

Downstream View Of Spillway Dam

FISHWAYS

Fish Counting Station

The Columbia River provides spawning grounds for tremendous runs of sa[illegible] mon, trout, and other migratory fish. In the spring and fall, these [illegible] fish seek passage by Bonneville Dam on their way upstream to their spawning grounds.

To give positive assurance of the upstream passage of the fish, three fis[illegible] ways were constructed; one at each end of the spillway dam, and [illegible] the face of the powerhouse. Each fishway consists of a collecting system, a fishladder, and a pair of fish locks. By-passes were also provided for the downstream migration of fish

[illegible]ach fishladder essentially consists of an inclined flume 40 ft. in [illegible] which are installed a series of weirs. These weirs create successive po[illegible] each of which is one foot higher than the next one downstream. These [illegible] circle around the ends of the dam and powerhouse and permit the adult [illegible] migrating upstream to reach the higher water level above the dam. The quantity of water flowing down the ladder is regulated to induce the fish to swim rather than jump from one pool to another. Fish counting stations are operated at each fish ladder to observe the success of the fishways and to obtain data necessary for the successful conservation of fish in connection with dams yet to be built on the Columbia River

Fish locks are similar in operation to the navigation lock. The fish are admitted to the lock when the water level therein is the same as the tailwater. The lower gate is then closed and the chamber is filled with water to the upper pool level. The fish rise and subsequently leave the lock chamber through an upstream gate. A slanting grating is lifted by a hoisting mechanism during the filling operation to insure that the fish actually do leave the lock before the next operation. Because the fishladders have proven entirely satisfactory in passing the migratory fish over Bonneville, the operation of the fish locks has not been necessary and they are held in readiness for use in emergencies.

STATISTICAL DATA

Spillway Dam

over-all length	1,4[illegible] ft
width of gravity section	[illegible] ft
width of baffle [illegible]	[illegible]
width of apron	approx [illegible] ft
crest elevation	+24 [illegible]
height above lowest be[illegible]	[illegible]
overflow section length	[illegible]
design capacity	[illegible]
gates	[illegible]
	[illegible]
piers	[illegible]
normal pool elevation	[illegible]
maximum pool elevation	[illegible]
gantrys	[illegible]
roadway width and elevation	[illegible]

Powerhouse

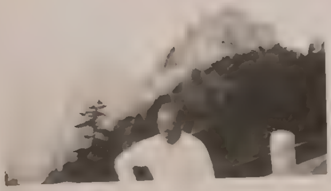
length	[illegible]
width	190 ft
height of roof above l[illegible]	[illegible]
station service unit	4,000 k.w. 0.8 power fact[illegible]
number of hydro-generating [illegible]	[illegible]
total rated capacity	518,400 k.w. 0.9 power fa[illegible]
generators	3 pha[illegible]
generator housing diameter	[illegible]
transmission voltage	[illegible]
Kaplan type turbines	[illegible]
	[illegible]
discharge per turbine	[illegible]
propeller	[illegible]
speed	[illegible]
thrust bearing load	approx. 3,000,000 [illegible]
wicket gates	20 - 4 ft. wide, 9.5 ft high

Navigation Lock

length	[illegible] ft
width	[illegible] ft
lift	[illegible]
capacity	[illegible]
downstream miter gates	2 - [illegible]
upstream miter gates	2 - 4[illegible]
filling and emptying ports	41 - 4 ft diam
filling and emptying valves	4 - 7 ft. x 11.5 ft., [illegible]
main culvert	14 ft. diam
filling and emptying time	approx. 15 min
depth over lower miter still at normal [illegible] water	[illegible]4 ft

Fishways

Fishladders:	
number	[illegible]
length: Washington Shore	1,[illegible]12 ft
Bradford Island	1,[illegible]12 ft.
width: Main Bradford Island	[illegible] ft
length of pools between transverse weirs	1[illegible] ft
vertical drop between successive pools	1 ft.
Fishlocks	
number	6
length	3[illegible] ft
width	2[illegible] ft
height	[illegible]5 ft.
Fingerling By-Passes (for downstream migrants	
number	6
width	4-8 ft.

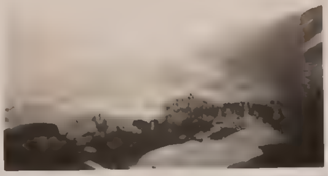


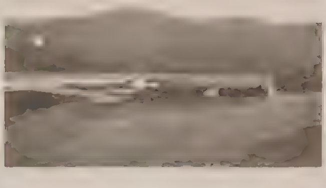
Sis + Mom -
Columbia River
4 Sept. 1948

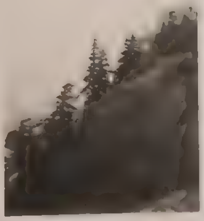
Hannah + Ed
Columbia River
4 Sept. 1948

Ed
Columbia River
4 Sept. 1948

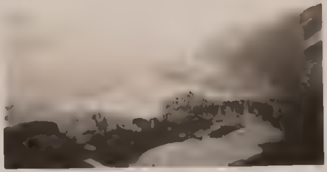
Ed
Columbia River
4 Sept 1948

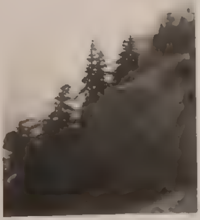


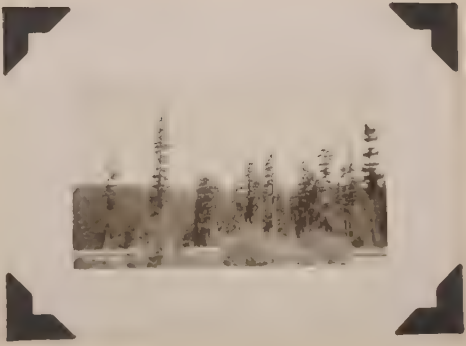




Mom & Sis -
Crown Point, Oregon
Sept. 1948

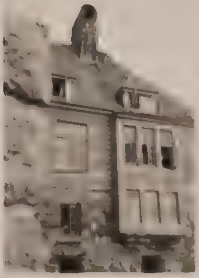




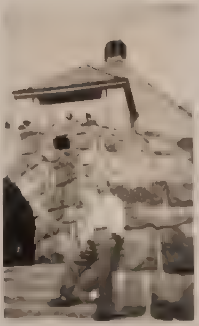


Mom sun in her eyes—
Mt. Hood, Oregon
5 Sept. 1948

Jennah
Timberline Lodge
Mt. Hood, Oregon
5 Sept. 1948



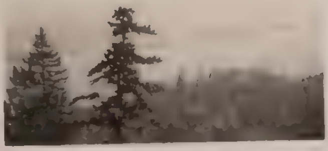
Ed
Timberline Lodge
Mt. Hood, Oregon
5 Sept. 1948



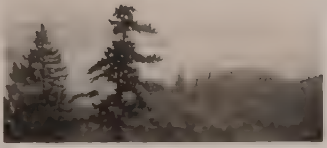
Lennah
Ski lift
Mt. Hood
5 Sept. 1948

Lennah
Mt. Hood, Oregon
5 Sept. 1948

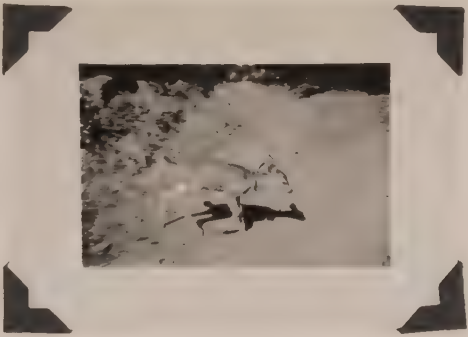
Lennah + Ed.
Mt. Hood, Oregon
5 Sept. 1948

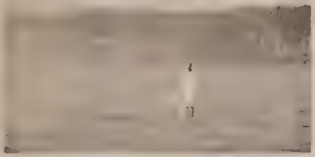


Jack
Bradley State Park
Oregon, U.S. 30
12 Sept. 1948



Fawns -
Bradley State Park,
Oregon, U.S. 30
12 Sept. 1948





S + B. Seining
12 Sept. 1948

S + B. Seining
12 Sept. 1948

CO.141.369